

2

ADA 129787

INDEPENDENT EVALUATION PLAN
FOR
THE JOINT OPERATIONAL TEST AND EVALUATION OF
ELECTRONIC WARFARE DURING CLOSE AIR SUPPORT
(EW/CAS) JOINT TEST, PHASE II
JUNE 1981

DTIC
ELECTE
JUN 23 1983
S B D

DTIC FILE COPY

APPROVED FOR PUBLIC RELEASE
DISTRIBUTION UNLIMITED.

83 06 22 025

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER	2. GOVT ACCESSION NO.	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) INDEPENDENT EVALUATION PLAN FOR THE JOINT OPERATIONAL TEST AND EVALUATION OF ELECTRONIC WARFARE DURING CLOSE AIR SUPPORT (EW/CAS) JOINT TEST, PHASE II		5. TYPE OF REPORT & PERIOD COVERED FINAL
7. AUTHOR(s) MR ANTON HAUSCHILD		6. PERFORMING ORG. REPORT NUMBER
9. PERFORMING ORGANIZATION NAME AND ADDRESS JOINT TEST AND EVALUATION DIVISION TEST INDEPENDENT EVALUATION DIRECTORATE COMBINED ARMS COMBAT DEVELOPMENTS ACTIVITY		8. CONTRACT OR GRANT NUMBER(s)
11. CONTROLLING OFFICE NAME AND ADDRESS FT LEAVENWORTH, KS COMMANDER, CAC ATTN: ATZL-TIE-J FT LEAVENWORTH, KS 66027		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)		12. REPORT DATE JUNE 1981
		13. NUMBER OF PAGES 24
		15. SECURITY CLASS. (of this report) UNCLASSIFIED
		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE
16. DISTRIBUTION STATEMENT (of this Report) UNLIMITED		
<div style="border: 1px solid black; padding: 5px; text-align: center;"> DISTRIBUTION STATEMENT A Approved for public release Distribution Unlimited </div>		
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report) UNLIMITED		
<div style="border: 1px solid black; padding: 5px; text-align: center;"> DISTRIBUTION STATEMENT A Approved for public release Distribution Unlimited </div>		
18. SUPPLEMENTARY NOTES		
19. KEY WORDS (Continue on reverse side if necessary and identify by block number) ELECTRONIC WARFARE CLOSE AIR SUPPORT EVALUATION PLAN ATTACK HELICOPTER OPERATIONS JOINT AIR ATTACK TEAM (JAAT) TACTICS COMMUNICATIONS JAMMING		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) The Electronic Warfare During Close Air Support (EW/CAS) Joint Test was a two-phased multiyear joint service test designed to determine the effects of hostile air defense and electronic warfare environments on Army attack helicopter operations in concert with close air support operations. The objectives of Phase II were to evaluate the relative effectiveness of various mixes of Blue EW equipment on Red air defense and evaluate the effects of denying critical elements of the Red air defense capabilities in close air support and attack helicopter operations.		

This report provides an Army-oriented plan for appraising the EW/CAS Phase II test. The evaluation plan identifies specific questions of Army interest and provides a framework for the evaluation test data. The issues identified for evaluation include communications jamming, training, JAAT tactics, and the synergistic effects of Air Force EW equipment with an overall objective of assessing the Army's preparedness and ability to conduct attack helicopter operations in a desert mountain terrain against threat forces equipped with EW and air defense assets.

1. Title		
2. Author		
3. Date		
4. Report Number		
5. Distribution		
6. Availability		
7. Avail		
8. Special		

A

✓

1/1

TABLE OF CONTENTS

	Page
1.0 EW/CAS Description	
1.1 Background	1
1.2 Scope of Phase II	2
1.3 Test Scenario	3
2.0 Issues and Associated Criteria	5
3.0 Concept of Evaluation	
3.1 Basic Test Design	11
3.2 Data Collection and Management	12
3.3 Method of Analysis	14
3.4 Test Limitations	16
3.5 Models/Simulations	17
4.0 Data Source Matrix	19
5.0 Milestone Chart	20
6.0 Key Personnel	21
7.0 Coordination	22

1.0 EW/CAS Description.

1.1 Background.

a. In March 1976, the Deputy Director, Research and Engineering (Test and Evaluation) (DDR&E (T&E)) directed the Weapons Systems Evaluation Group (WSEG) to develop a design definition, and a test design for a joint operational test and evaluation of electronic warfare during close air support (EW/CAS). The US Air Force was appointed the lead Service for the test.

b. The principal objective of the JOT&E was to determine the effectiveness of selected mixes of Blue EW equipment and tactics on the Air Force and Navy/Marine CAS and Army aviation operations in support of ground forces near the forward edge of the battle area (FEBA). The environment of interest related to a conventional war in Central Europe in the time period of the test. A second objective was to assess the effectiveness of the Blue command and control net of the combined arms team in requesting air support when faced with selected mixes of Blue and Red EW. A third objective relating to the safety of aircraft supporting ground operations was to validate procedures used by Blue ground-based air defense forces to identify and engage threat aircraft in an air support environment.

c. In July 1976 the Army completed an Independent Evaluation Plan (IEP) for EW/CAS testing that was prepared by the US Army Operational Test and Evaluation Agency (OTEA) in coordination with a special US Army ad hoc task force. The IEP, entitled "Effects of Electronic Warfare for US Army Elements Participating in a Joint Service Combined Arms Team" had a much broader scope than close air support aspects. The major test objective was to assess the broad impact of EW on participating Army elements in the overall conduct of combat operations. IEP issues related to four areas:

- o Command, control, and communications
- o Reconnaissance, surveillance and target acquisition (RSTA)
- o Target engagement
- o Doctrine, tactics, techniques and organization

d. WSEG Report 296, Part A, "Design Definition for a Joint Operational Test and Evaluation of Close Air Support During Electronic Warfare," was issued in October 1976. One of the report recommendations was to divide the JOT&E into two test phases. Phase I was to be a preliminary test restricted to the problem of overcoming communication jamming near the FEBA in carrying out attack helicopter support, close air support (CAS), or other operations in support of ground forces. The Army suggested a change in which phase I would include, to the extent possible, service objectives related to the effects on an intense ECM environment near the FEBA. Phase II was to be directed toward satisfaction of the originally stated EW/CAS JOT&E principal objective. The WSEG report recommendation for a two-phase test and the Army-suggested change were subsequently approved.

e. Phase I, Tactical Communication Jamming (TCJ) identified six sets of incrementally conducted trials (tests). Tests 1-3 were scheduled to collect baseline data, under developmental test type conditions, and develop basic information on the effects of high power UHF, VHF/FM, and HF noise jamming on close air support communication links. Test 4, conducted at Eglin AFB, Florida, as were Tests 1-3, investigated the effects of Red ICD and jamming on Blue CAS air request and response nets. Tests 5 and 6 were conducted at Ft Irwin, CA. Test 5, conducted in a CPX mode, investigated Red ICD and jamming effects on combined arms command, control, and communications (C3) with emphasis directed toward the effects on Blue ground communications. Test 6, TCJ phase testing, was completed in March 1980 and again investigated Red ICD and jamming effects. Test 6 was conducted during the REDCOM-directed Gallant Eagle 80 Exercise. Overall, the objectives of the Tactical Communication Jamming phase were threefold:

- o To evaluate Blue C3 network vulnerability to detection disruption by Red EW elements.
- o To determine the effectiveness of Blue ECCM techniques.
- o To evaluate Blue C3 network vulnerability to unintentional electromagnetic interference.

f. Phase I was conducted incrementally from September 1978 through March 1980. The scenario was based on a conventional war in Central Europe in the late 1970's. Forces included elements of a Soviet motorized rifle division (MRD) involved in a breakthrough operation against a US mechanized infantry brigade. Test reports on phase I have been published, and an Independent Evaluation Report (IER) has been completed by OTEA.

g. Since air-to-air and ground-to-air communications were not heavily targeted during Phase I testing, no conclusive result were obtained. Hopefully, phase II will resolve/clarify this issue.

1.2 Scope of Phase II.

a. Air support operations testing, the second phase of EW/CAS, involves Army, Marine, and Air Force elements. The objectives of Phase II can be simply stated as, "What is the influence of EW activities on the CAS and attack helicopter (AH) mission?"

b. To perform EW testing, a threat environment must be simulated. This is being done through the procurement of AD/EW threat simulators and integrating them with existing AD/EW threat simulators to create a realistic threat environment. Though limitations exist, the AD/EW threat systems are complete and include acquisition radar, command and control data and voice links, and target tracking devices. The threat environment was to be completed so that testing could begin in early 1981. The test was to be a large scale effort conducted over a 6-month and period involve significant Service assets. Because of delays in delivery of threat systems and

instrumentation, calibration, and resource constraints, the phase II scope and duration of testing have been significantly reduced, the objectives modified, and the test date slipped.

c. The test now consists of a 3-week Marine test and a 6-week joint Army and Air Force trial period. The objectives for these segments are:

(1) Evaluate the relative effectiveness of various mixes of Blue electronic warfare equipment and tactics in CAS and attack helicopter operations in a threat air defense environment.

(2) Evaluate the effects of denying critical elements of Red air defense capabilities on Blue CAS and attack helicopter operations.

The first objective will provide information to assess the separate and collective effectiveness of Army/USAF tactical air operations and EW operations while conducting close support in a threat AD/EW environment. The second objective will assess the effects of neutralizing elements of the Red AD system on close air support and attack helicopter operations.

1.3 Test Scenario.

a. EW/CAS Phase II Army/AF testing will be conducted under prevailing weather condition in the desert/tabletop/mountain terrain (100nm NW) of Nellis AFB. The scenario involves an attempted breakthrough of a Soviet-trained MRD in a threat AD/EW environment in the Middle East. The EW and AD assets are representative of a slice of a MRD. This scenario is used to fix the location of friendly and enemy forces in time and action during a 30-minute segment of the battle that will constitute a test trial.

b. Enemy forces are represented by nonmoving wooden replicas of armored fighting vehicles. The Red AD and EW units will be manned active simulations of the systems they represent, but are fewer in number than expected in an MRD because of limited test resources. Red EW efforts will be directed against fixed and rotary wing aircraft and limited ground communications.

c. The Blue forces comprise an adequate quantity of fixed wing aircraft for CAS and battlefield air interdiction and attack and scout helicopters. Blue ground forces will be represented by vehicles similar to the Red vehicles. Blue air support must, therefore, discriminate friend from foe. Blue fixed wing aircraft will carry various combinations of ECM equipment to counter the AD units and will include stand-off jammers and Wild Weasel aircraft during specified trials.

d. The attack helicopter team (AHT) will consist of five AH-1S and three or four OH-58C helicopters. The team will utilize tactics developed jointly with the Air Force and approved by the Army tactics committee. The tactics will be a combination of those contained in FM 17-50, with specific variations resulting from terrain and altitude condition and to facilitate data gathering

during the test. The team will be tasked to engage and destroy Red armor and personnel vehicles attacking Gold Reed and Trailer Pass.

e. Trials will be conducted during daylight hours in prevailing weather conditions on the Nellis Test Range. The Army helicopters will represent current equipment in service. The only ECM equipment the helicopters will carry will be the APR-39 radar warning receiver. Testing of developmental ECM systems or munitions is not planned.

2.0 Issues and Associated Criteria.

a. The basis for evaluating EW/CAS phase II is found in the following paragraphs. These issues reflect specific questions of Army interest and provide a framework for the evaluation process. They will be examined under the conditions of an active air defense threat and the results will be used by the concepts and doctrine community.

2.1 Issue: Can essential communication be effected/maintained while conducting operations in an AD/EW environment?

2.1.1 Scope:

a. When planning for and engaging Red armor and AD threats, the AHT must communicate between helicopters, with Air Force fixed wing aircraft, and with ground command and control personnel. The Red threat contains jammers that will be attempting to jam the VHF and UHF communications to reduce the effectiveness of the AHT and JAAT tactics. The Red jammer systems will be instrumented with data recording devices to collect time, voice, equipment status, and event data on magnetic tape. Aircraft and command posts will use voice time tape records (VTTR) to record all voice communications. Aircrews and the jammer operators will also be debriefed after each mission. Analysis of this data can determine when jamming was attempted and what actions were taken to circumvent the jamming attempts.

b. Standard operating procedures (SOP) for communicating between aircraft in a platoon or team will always include ways to transmit messages without the use of the radio. Some alternative methods of communication are:

- o Send-A-Message System
- o Hand and arm signals
- o Brevity code
- o Light signals
- o Aircraft position or movement

Unit SOPs should specify details for each method. Unit team members or sections should coordinate the system to be used. Analysis of this issue will also entail an evaluation of the effectiveness of the alternative methods of communications that are used to circumvent jamming.

2.1.2 Criterion: Evaluation of this issue will be based on the subjective analysis of the above-mentioned data by Army aviation and communication personnel knowledgeable in this area. Specific effects to be evaluated are:

- a. The initial linkup/formation of the JAAT.
- b. Coordination to and from ground command posts.

c. Target hand-off procedures between scout and attack helicopters or the Forward Forward Air Controller (FFAC) and A-10's.

d. Successful conduct of designated missions.

e. Transmission of airspace management, threat, weather, and other information among JAAT and ground units.

f. Time required to complete communications.

g. Ability of communicator to recognize an EW attack.

h. Alternative method of communication.

2.1.3 Rationale: Helicopter air-to-air and ground-to-air communications were not heavily targeted during phase I testing which was in consonance with current threat doctrine on targeting priorities. This, coupled with the fact that few communications were attempted, provide inconclusive test results. Testing in phase II is designed to resolve/clarify this issue.

2.1.4 Source: Phase I test results and test report.

2.2 Issue: Are JAAT tactics/procedures effective in an AD/EW environment?

2.2.1 Scope: A memorandum of understanding that identifies the joint tactics and procedures to be employed during EW/CAS has been developed. This memo states that whenever A-10s and helicopters operate in the same pass, JAAT procedures will be used. The following procedures have been established for EW/CAS.

a. The AHT will conduct map and aerial reconnaissance of the battle area prior to testing to identify NOE routes, checkpoints, battle positions, kill zones, and intervisibility.

b. An initial face-to-face meeting between each deployed A-10 unit, AHT members and the FFAC must take place prior to conducting JAAT operations. Face-to-face briefings are waived for subsequent JAAT missions. Kill zones, checkpoints, ingress/egress routes, frequencies, call signs, battle management options, and immediate (not preplanned) JAAT procedures will be coordinated.

c. Telephonic coordination will take place prior to each planned JAAT mission and a telephonic debrief will occur after every JAAT mission.

d. A face-to-face debrief will be conducted at least weekly.

e. A fourth OH-58 aircraft will be provided for FFAC use during all planned JAAT missions.

f. The White force will execute visual cues for marking the target area under the direction of the FFAC.

g. Communications will be carried out in accordance with figure 1.

h. The team leader will manage overall JAAT operation through coordination with the forward FAC.

2.2.2 Criterion: Evaluation of this issue will be based on a comparison of the appropriate measures of effectiveness defined in section 3.2. Data for each of these measures will be collected for trials where JAAT procedures were utilized and compared to trials where JAAT procedures were not used. These measures will be compared both for helicopters and A-10s. The degree of change between measures, will be determined in order to assess the overall change in the mission performance of the AHT. These measures, along with subjective inputs from observers, members of the Army evaluation team, and data collectors, will be used to make a subjective evaluation of the effectiveness of the tactics used. Specific recommendations for changes to the tactics will also be solicited.

2.2.3 Rationale: EW/CAS offers an opportunity to evaluate JAA tactics/procedures against an integrated AD/EW threat environment. Potential weaknesses in tactics need to be addressed and surfaced.

2.2.4 Source: CACDA.

2.3 Issue: What training value was obtained for the AHT in participating in EW/CAS?

2.3.1 Scope: Participation in EW/CAS by Army aviation elements will entail 576 sorties or 288 hours of flying time during the test trials. Additional hours and sorties will be needed during pretest trials. EW/CAS will give Army helicopter crews an opportunity to fly against an integrated Red AD/EW threat array in a high desert/table-top/mountainous and a difficult density-altitude environment. In addition, JAAT tactics will be used with Air Force elements. The Army aircrews will be questioned on the value of the experience they obtain while participating in EW/CAS; whether they had any previous experience in flying against an AD/EW threat array; what insights they obtained flying in the Nellis terrain, and if special training is required for operation in a high desert/table-top/mountainous environment.

2.3.2 Criterion: The performance of the AHT will be evaluated with respect to the appropriate missions/tasks/standards outlined in ARTEP 17-385 to determine if additional training is required for operations in high/table top/mountainous environment. Subjective reviews of aircrew debriefings will be used to evaluate this issue.

2.3.3 Rationale: This issue and the criteria will help the Army to determine the training value of participation in EW/CAS and provide guidance for participation in future tests of this type. The experience and knowledge gained during testing can be useful in upgrading current AHT training, tactics, and techniques.

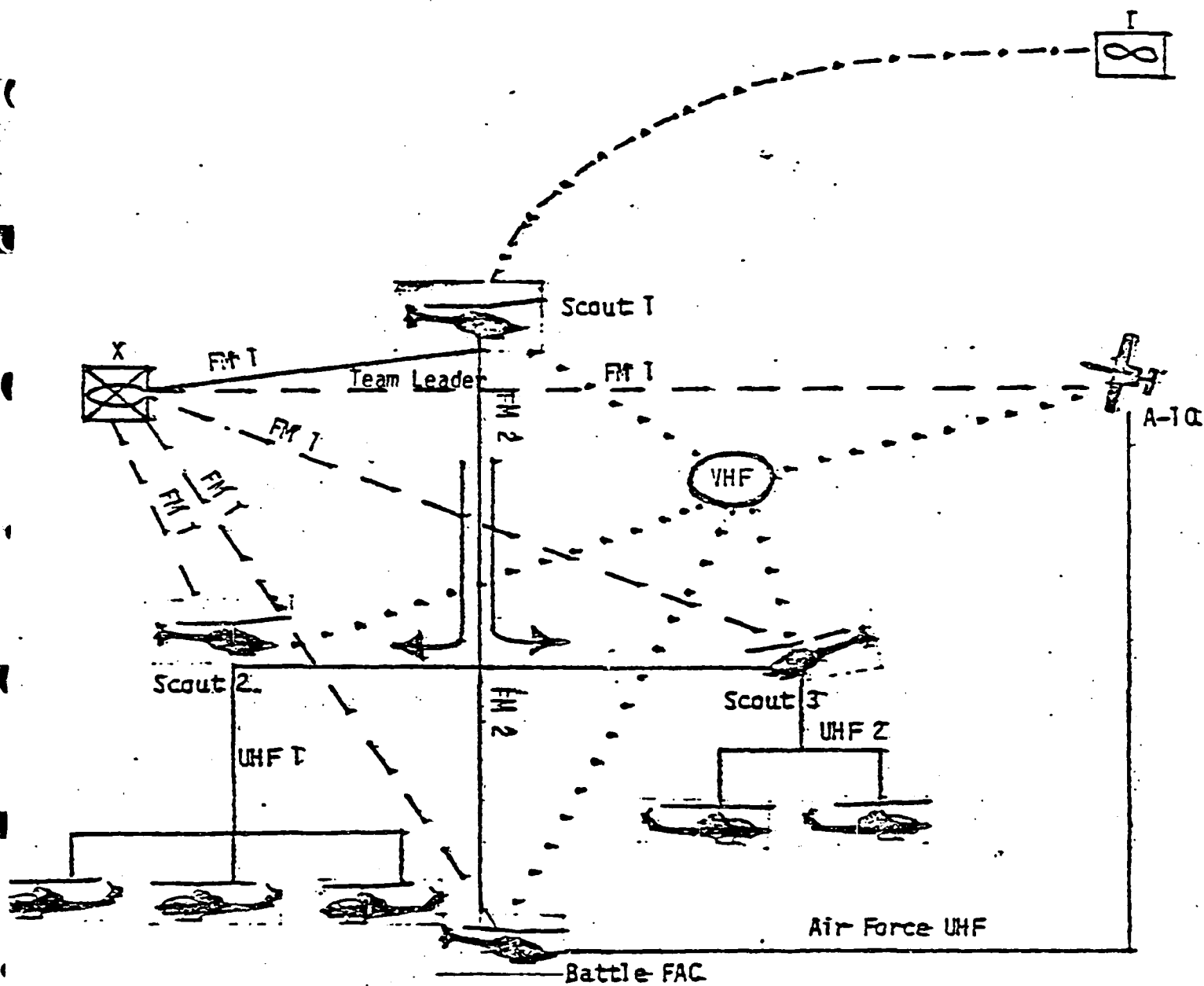


FIGURE 1. JAAT COMMUNICATIONS PROCEDURES

2.3.4 Source: CACDA

2.4 Issue: Does the number and type of Air Force aircraft operating in vicinity of the FEBA affect the AHT?

2.4.1 Scope: The AHT will be attacking threat targets in conjunction with various numbers and types of Air Force fixed wing aircraft. This issue will attempt to identify if the number or type of Air Force aircraft has any impact on the effectiveness of the AHT.

2.4.2 Criterion: Evaluation of this issue will be based on a comparison of the appropriate measures of effectiveness defined in section 3.2. Data for each measure will be collected for the various numbers and types of Air Force fixed wing aircraft and tactics that were used. The degree of change between measures will be determined in order to assess the overall change in the mission performance of the AHT.

2.4.3 Rationale: This issue will provide the Army information about the possible synergistic effects various Air Force aircraft operating in the vicinity of the FEBA have on AHT operations. This information could improve the effectiveness of the AHT and aid in the planning of joint air attacks.

2.4.4 Source: CACDA.

2.5 Issue: Does the use of EW equipment by the Air Force affect the AHT?

2.5.1 Scope: The AHT along with Air Force fixed wing aircraft will be attacking Red targets. The Air Force aircraft will be equipped with various mixes of EW equipment. The four configurations that will be tested are:

- a. RWR only
- b. RWR and chaff
- c. RWR, chaff, and self-protection ECM pods.
- d. RWR, chaff, and self-protection ECM pods with supporting Wild Weasels and stand-off jammers.

2.5.2 Criterion: Evaluation of this issue will be based on a comparison of the appropriate measures of effectiveness defined in section 3.2. Data for each measure will be collected for the four EW equipment configurations that are being tested. The degree of change between measures will be determined in order to assess the overall change in the mission performance of the AHT.

2.5.3 Rationale: This issue will provide the Army information about the possible synergistic effects various Air Force ECM equipment has on AHT operations. This information could improve the effectiveness of the AHT and aid in the planning of joint air attacks.

2.5.4 Source: CACDA.

2.6 Issue: How does the denial of various elements of the Red AD capability affect the AHT?

2.6.1 Scope: To assess the effects of neutralizing elements of the Red AD system on Army and Air Force aircraft conducting air attack operations, various elements of the Red AD capabilities will be rendered inoperative. Four specific configurations of the Red AD have been chosen for evaluation. These are:

- a. Integrated.
- b. No Acquisition Radar.
- c. Isolated and No Acquisition Radar.
- d. Isolated plus limited Acquisition Radar.

The first configuration consists of an integrated Red systems where all systems, command and control, and data links are operational. The other three configurations are specific degradation levels that will be tested. The first degradation consists of completely denying the Red threat the use of all acquisition radars including those integral to the threats. This will force all the acquisitions to be optical. The second level of degradation is the same as the first plus the fact that no communication between the various command posts will be allowed. The last level of degradation is the same as the third, however, acquisition radars integral to the threats will be allowed to operate.

2.6.2 Criterion: Evaluation of this issue will be based on a comparison of the appropriate measures of effectiveness defined in section 3.2. Data for each measure will be collected for the four modes of operations. The measures for each of the degraded ADU configurations will be compared to those of the fully integrated ADU. The degree of change between measures will be determined in order to assess the overall change in the mission performance of the AHT.

2.6.3 Rationale: An answer to this issue will identify which elements of the Red AD capability should be degraded to yield the greatest return in terms of increased effectiveness of the AHT.

2.6.4 Source: CACDA.

3.0 Concept of Evaluation.

3.1 Basic Test Design.

a. The phase II air support operations will be conducted on the southern portion of the Tonopah Test Range. Enemy air defense and radio electronic combat systems, which represent the assets of a partially attrited MRD, will be deployed in a 10x40-kilometer area. Friendly forces will be comprised of Air Force CAS, offensive air support, defense suppression, ECM support aircraft, and Army attack/scout helicopters. Minimal Blue ground C3 elements will also participate. Red ground forces are attacking Blue forces at two points along the FEBA, Gold Reed and Trailer Pass which are approximately seven kilometers apart. The Blue air elements are tasked to engage and destroy Red armor attacking these two passes. These Red assets are protected by an integrated AD/EW system.

b. Test trials will be conducted 4 days a week. Each day will consist of three 30-minute trials. A maximum of 26 Blue airborne players will participate in a typical trial. The Air Force aircraft will carry/utilize four combinations of ECM.

- o Radar warning receiver (RWR) only
- o RWR and chaff
- o RWR, chaff and self-protection ECM
- o RWR, chaff, self-protection ECM, Wild Weasel, and stand-off jammers.

c. Four operational conditions of the Red air defense system will also be compared. They are:

- o Fully Integrated
- o No Acquisition Radar
- o Isolated and No Acquisition Radar
- o Isolated and Limited Acquisition Radar

These combinations of ECM assets and Red AD operational conditions have been combined into a test matrix (table 1). Ideally, that matrix would be implemented by replicating the entire matrix a number of times. Unfortunately, time and cost constraints have limited the replication to the 48 shown in table 1.

d. Army attack and scout helicopter ECM equipment (APR-39) will remain constant for all trials. The Army air package will consist of a mix of aeroscout and attack helicopters. Organizationally, these aircraft will normally operate in the following configuration:

- o Attack helicopter pure trial: three OHs and five AHs (3X5)
- o JAAT trial: Four OHs and five AHs (4X5) (extra OH has FFAC)

The minimum number considered tactically self-sufficient for the EW/CAS scenario is a 2X4 mix for pure AH trials and 3X4 for the JAAT trials. The AHT will operate from only one ingress route (pass) during each trial. In addition JAAT procedures will be used whenever A-10s operate in the same pass as the helicopters.

3.2 Data Collection and Management

a. For EW/CAS testing, all Red threats and jammer systems have been instrumented with data recording devices to collect time, target location and event data on magnetic tape. Except for one XM42, all threat data is recorded on cassette tapes and later converted to 9-track computer tape. Video tapes, manual log data, and VTTR's will also be used.

b. The Range Measurement System (RMS) will collect and produce on computer tapes, aircraft time-space-position-information (TSPI), timed aircraft weapon release signals, Wild Weasel simulated launch signals, and radar altimeter data. Aircraft on-board data sources include:

- (1) VTTRs
- (2) Electronic clipboards
- (3) Maverick video
- (4) Army attack helicopter video
- (5) Air Force gun camera film
- (6) Limited manual log data
- (7) Air Force SOJ data tapes

In addition, air crews will be debriefed after each mission. Data collected during these debriefings will be recorded on manual debriefing forms. Blue ground/air communications data sources include:

- (1) Blue ground commander and fire direction radio nets manual log
- (2) Ground to air Army aviation response net manual log data
- (3) Blue force CAS/Army attack helicopter response net manual log.

TEST MATRIX

THREAT	RWR	RWR+CHAFF	RWR+PODS +CHAFF	RWR+PODS+CHAFF+ WW+CIJ
INTEGRATED	6	6	8	10
NO ACQ RADAR			6	
ISOLATED NO ACQ			6	
ISOLATED LIMITED ACQ	6	6	8	10

40% OF TRIALS W/JAAT

72 SCHEDULED TRIALS
TO PROVIDE
48 REQUIRED TRIALS

TABLE 1

17/00000

c. All EW/CAS computer processing will be accomplished post-trail. There will be no real-time processing of data or real-time data transfer as all data collected during testing must be transported to Nellis AFB for processing. Manual data will be entered into the computer systems at Nellis via remote terminals. Cassette, electronic clipboard, and RMS data will be consolidated, checked, and corrected and sorted into major files. The trial reconstruction group will review this data along with video tapes from the threats, aircraft gun camera film, audio tapes, and subjective information from player debriefings in order to categorize launch/fire events as either paired, missed, or indeterminant. Each trial will then be reconstructed as if occurred during the test. Trials may be declared invalid based on criteria established by a Trial Validation Committee. If validated, the data will become part of the EW/CAS data base and undergo further analysis.

d. Updated files generated as a result of trial reconstruction and validation will be used as input to fly-out models for assessing ground-to-air engagements. Air-to-ground engagements will be assessed in terms of successful passes via munition specific algorithms. The results will be merged into a master event file and recorded on 9-track computer tapes and distributed to the Services for analysis.

3.3 Method of Analysis

a. Analysis of the data will be accomplished by comparing different mixes of EW equipment, and the operational conditions of the Red ADU system. Statistical tests will determine if one group is significantly different from another. The probability of observing a statistically significant effect is affected by the magnitude of the effect, the variability of results, and the sample size.

b. For comparison of EW equipment levels, the analysis will use the data from the matrix columns (table 1) associated with each group of EW equipment. Therefore, to compare two EW equipment conditions, the analysis would use samples from the cells in the column corresponding to first condition to that of another column. If six samples are obtained per cell, then the minimum sample size for the various EW equipment comparisons is twelve samples. Comparisons between the operational conditions of the Red ADU system will be made using the rows in a like fashion.

c. Individual cell-to-cell comparisons can be made within the constraints that two cells must come from either the same row or the same column so that only the variable of interest changes between the two cells. The sample size available for cell-to-cell comparison, is much smaller, which means the confidence in cell-to-cell comparisons will be less than the column or row comparisons.

d. Specific measures of effectiveness will be used in the comparison of the different mixes of EW equipment, the operational conditions of the Red ADU system and the different force employment techniques. The measures that have been derived to date are:

By Threat and Aircraft Type

- Time and number of acquisitions
- Time and number of lock-ons (tracks)
- Time and number of break-locks and reason if known
- Time and number of ADU firings
- Quality of the ADU engagement (closest point of approach)
- Range of ADU engagement
- Number of targets of opportunity
- Number of targets assigned by C2
- Subjective comments from crews and debriefings.

By Aircraft Type

- Time line of sight is established to threats
- Time and number of RWR lock-on alerts
- Time and location of weapon firings
- Category of weapon firing
- Range of targets engaged
- Subjective comments from crews and debriefings

For JAAT

- Time initial JAAT communication is attempted
- Subjective comments from participants and observers

For Communications

- Time and number of messages attempted
- Time and nature of EW attack
- Recognition by communicator of EW attack
- Nature of ECCM action
- Time message was completed
- Subjective comments from participants and observers

e. The quality of the ADU engagement will be determined in post trial analysis by computing a closest point of approach (CPA) of the ADU firing to the aircraft engaged. CPAs will be determined using a computer simulation flyout model that takes into account launch geometry, threat track data, missile/projectile dynamics and guidance, and the flight path of the target aircraft. CPAs less than the warhead lethal blast radius will be class 1 engagements (highest quality). Class 2 engagements will be CPAs greater than the warhead lethal blast radius but still within the general vicinity of the target aircraft. All other engagements will be class 3. Probability of kill

will not be used to measure the quality of engagements because end game modeling and the instrumentation systems are not accurate enough. This is especially true when trying to evaluate helicopter engagements that require very accurate location data.

f. The category of weapon firings by aircraft will be determined by examining the weapon delivery parameters at the time of the weapons release signal. Each aircraft attack will be categorized as an attack on a brief (assigned), collateral, or friendly target, or as an invalid or no target attack.

g. As envisioned comparison of the quality of engagements, the number and category of weapon firings and responsiveness of aircraft and ADUs will be the primary measures of effectiveness. Other variables that must be considered in evaluating and comparing the measures of effectiveness are weather conditions, time of trial, number of threats active, the presence of smoke/dust, and the pass in which the engagements occurred.

3.4 Test Limitations.

a. Although phase II testing strives for the most realistic operational environment possible, it has limitations that cause it to fall short of combat. In analyzing the test results, it will be essential that the possible effects of the limitations listed below be taken into consideration before conclusions and recommendations are formulated.

(1) There is no real-time casualty assessment during the test trial. Although this can be compensated for, to some extent, in post-test analysis, there is no adequate substitute for a real-time capability.

(2) The targets for the Blue strike aircraft are wooden replicas of armored fighting vehicles that will remain stationary and will not give a good representation of the simulated vehicle. Acquisition by Blue aircraft will be more difficult because no dust trails will be generated to act as visual cues. (Standard procedure is to attack only moving targets.)

(3) Ground-to-ground communications links will not be played. Only the ground-to-air link will be used, thus creating an artificial priority.

(4) Red air is not a participant.

(5) Artillery, tank, and small arms fire will not be played. These ordinarily are significant threats to the AHT.

(6) Meaningful IR threats are not being fielded thus no usable data on this type of threat will be provided.

(7) Even though thirty-four ADUs are fielded in the threat array only ten will provide the complete array of data. The remaining threats are emitters only.

(8) There will be an aircrew learning curve effect because threat targets will not be moved, and aircrews will be rotated every 2 weeks at best.

(9) Instrumentation limitations may not allow accurate assessment of aircraft engagements. Documented limitations of the range measurement system, training, and flyout models must be considered when attempting to determine the quality of the engagements.

(10) Because trial assessment would not be possible, the ZSU-23-4 simulators will not be allowed to operate in the optical mode (mode 4).

3.5 Models/Simulations.

a. Simulations make it possible to analyze the effectiveness of electronic warfare techniques before and after missile launch. Many flyout models are currently available and in use throughout the community. The Air Force's TAC ZINGER models for the SA-4, SA-6, SA-8, and the ZSU-23-4 will be used to determine the quality of engagements in EW/CAS. It was recognized that some model modifications and sensitivity analysis would be necessary before the models could be generally accepted for analyzing test results.

b. Modification of the TAC ZINGER models has been completed; however, sensitivity analysis and critique by MIA are not yet complete. IDA will document the exact capabilities and limitations of those models and submit its findings to the JTD. Any limitations must be considered in the analysis of the quality of engagements that will result.

c. TAC DISRUPTER (TD) is a computer simulation being developed by General Dynamics under the auspices of EW/CAS for use in support of test design and post test evaluation. TD will be an upgrade of an air defense model that will provide a generally improved logical structure and new, enhanced functional capabilities for the evaluation of encounters between offensive air elements, including helicopters, and defensive ground (SAM/AHA) elements.

d. TD was not ready to assist in the test design of EW/CAS. The JTF does not require the model for evaluation of EW/CAS results, however, results from EW/CAS will be used to validate portions of this model. Some questions that TD supposedly can answer about EW/CAS are:

(1) What is the impact of Wild Weasel aircraft?

(2) What is the effect of not having a full complement of IR systems?

(3) What effect would European terrain have on the test results?

(4) What is the effect of not having real-time casualty assessment/removal?

e. TD will have the capability of simulating attack helicopter operations. However, the terrain masking/resolution capabilities are considered inadequate. Some upgrade of these capabilities may be required to utilize this model to extrapolate EW/CAS test results. The Air Force will use the results from EW/CAS to verify and validate portions of TD and use it in its independent evaluation of EW/CAS. TD capabilities should be reviewed by the Army for possible application in its independent evaluation of EW/CAS. Other available Army models should also be considered for analyzing and extrapolating EW/CAS results.

4.0 Data Source Matrix.

ISSUES: Sources	2.1	2.2	2.3	2.4	2.5	2.6
EW/CAS Phase II	P	P	P	P	P	P
EW/CAS Phase I	S	-	-	-	-	-
AAH OT II	S	-	-	-	-	S
TASVAL	-	S	-	-	-	-
After-Action Reports	S	S	S	S	S	S

P - Primary Source
S - Secondary Source

5.0 Milestone Chart.

Establish Army POCs	27 March 1981
Distribute Draft IEP for Comments	31 March 1981
Finalize IEP	5 June 1981
Hold pretrail IPR at Nellis	August 1981
Begin USA/USAF trails	12 October 1981
End USA/USAF trails	21 November 1981
Brief emerging results	21 January 1982
Submit IER to DA	21 March 1982
Complete Test Report (JTF)	May 1982

6.0 Key Personnel.

CACDA		
COL Ken Montgomery	Dir, T&E	552-2585
LTC Arnold	T&E	552-2585
Anton Hauschild	T&E	552-2585
TRADOC		
LTC McQuestion	ODCSCD	680-4243
OTEA		
MAJ Claxton	CSTE-POJ	289-1516
MAJ Baker	CSTE-FTD	289-1818
JTD		
COL Le Mere	Army Deputy JTD	682-2980
LTC Alverson	JTD	682-4320
MAJ North	JTD	682-4320
DA		
LTC Sughrue	DAMO-RQT	225-9448
LTC Tannenbaum	DAMI-FIT	225-2118
FT BLISS		
Mr. Krasovetz	ATSA-CDT	978-3123
TRASANA		
Mr. Velez	ATTA-TCC	258-1763
FORSCOM		
MAJ Conley	AFOP-CM	588-2220
MAJ Newton	III Corps AFZF-DPT-PO	737-4437
CPT Bennett	6th Cav Brig AFVM-A	737-3010
FT RUCKER		
COL Funk	ATZQ-TSM-A	558-2108
MAJ Springsteen	ATZQ-D-MA	558-2406
FT KNOX		
MAJ Lacasse	ATZK-AAD-TD	464-3914

7.0 Coordination

This IEP has been coordinated with the following centers/activities. A listing of responses, comments accepted or not accepted with rationale for nonacceptance are listed below:

Comments		Comments	Comments
<u>Accepted</u>		<u>Rejected</u>	<u>Received</u>
USAADC	4	4	-
USAAVNC	8	8	-
TRASANA	33	33	-
USAARMC	1	-	1
TRADOC	8	6	2
EW/CAS JTF	41	41	-
TCATA	1	1	-
OTEA	17	15	2
6TH CAV BRIG	14	14	-
USA SIGCEN	0	-	-
CAC			
Threats	1	1	-
C3I	10	10	-
CDD	2	2	-
TACLO	2	2	-
SWG	0	-	-

Rationale for nonacceptance.

USAARMC: A new issue was not added, however, the scope of issue 2.2 was expanded to include this point.

TRADOC:

Comment 1: Section 3.0 has been expanded and describes the general test approach and concept of analysis.

Comment 7: The effects of the test limitations are unknown.
The limitations are presented for the analysts to consider in their evaluation of the test results.

OTEA:

Comment 2: The criteria for the issues have been expanded and clarified.

Comment 17: As a TRADOC activity we will use the format contained in TRADOC Reg 71-9. ,